REMARKS

The enclosed is responsive to the Examiner's Office Action mailed on February 25, 2008. At the time the Examiner mailed the Office Action claims 1-22 were pending. By way of the present response Applicant has amended claims 1, 5, 11, 14, 15 and 18-22 in order to more particularly point out and distinctly claim the subject matter which Applicant regards as the invention. No claims have been canceled. New claim 23 has been added. As such, claims 1-23 are now pending. Applicant respectfully requests reconsideration of the present application and the allowance of all claims now presented.

Claim Rejections – 35 U.S.C. § 103

Claims 1-4 and 22

The Examiner rejected claims 1-4 and 22 under 35 U.S.C. § 103(a) as being unpatentable over He et al., U.S. Pat. No. 6,656,535 B2 (hereinafter "*He*") in view of Takamasa et al., U.S. Pub. No. 2004/0129294 A1, (hereinafter "*Takamasa*"). However, Applicant respectfully submits that the combination does not teach each and every element of the invention as claimed by Applicant in claims 1-4 and 22.

Applicant teaches and claims in independent claim 1 a **method for producing a substrate suitable for subsequent use in semiconductor processing**. That is, the process taught and claimed by Applicant in independent claim 1 concerns treating the substrate ***which may then be used*** in the production of semiconductor assemblies. The method includes roughening the surface of the substrate material, treating the roughened surface with a strong acid, and **applying a coating composition containing at least one metal oxide** onto the roughened surface to provide a non-conductive surface suitable for subsequent use in semiconductor processing.

The surface of the substrate material is roughened in order to improve the adhesive capability of the surface. The roughening is characterized as creating microfissures. Then, the roughened surface is treated with a strong acid such as nitric acid and/or hydrofluoric acid.

Applicant has observed that jagged edge pieces of the microfissures can be dislodged or broken off from the surface and thus the microfissures themselves may be a source of undesirable loose particles after the strong acid etch. Accordingly, Applicant teaches and claims in independent claim 1 to **apply a coating** composition containing at least one metal oxide onto the roughened surface. The **applied coating is of sufficient thickness to fill and cover the microfissures**. As a result the applied coating prevents the dislodgment of any microparticles of the substrate material that may be present in the microfissures, and additionally prevents jagged edge portions of the microfissures from dislodging to become loose particles. Thus, Applicant teaches and claims in independent claim 1 a method of treating the surface of a substrate material, which includes sealing a roughened surface with a deposited coating composition containing a metal oxide, so that small particles are not generated during subsequent use in the production of semiconductor assemblies.

It is Applicant's understanding that *He* discloses a method of fabricating a coated process chamber component for the subsequent use in extended fabrication processes. In summary, the chamber component is bead blasted to provide a surface having a relatively low roughness and dipped into a solution having a low acid concentration. This is followed by the formation of a metal coating over at least a portion of the chamber component.

As described at col. 4, lines 1-25, the bead blasting is performed without excessive roughening of the surface. The surface roughness (Ra) is kept less than about 150 microinches, and **the formation of microckracks is intentionally avoided**. As stated at col. 4, lines 18-19, the formation of microcracks during bead blasting is to be avoided because they can be exacerbated (or intensified) during subsequent treatment steps such as wet cleaning steps.

The chamber component is then treated with a solution comprising a low concentration of treating agent. As described at col. 5, lines 34-65, the volume percent of an acidic treating solution is below 20%.

Finally, a metal coating is deposited over a portion of the chamber component. The coating may be applied, for example, by a plasma arc method.

With regard to claims 1-4 and 22, Applicant respectfully submits that *He* fails to disclose or suggest each and every element of the invention as claimed.

Foremost, *He* fails to disclose or suggest the element of "roughening a surface of the substrate material, wherein the **roughening produces microfissures**." As described above, not only does *He* not disclose or suggest producing microfissures, but *He* **teaches away** from producing microfissures.

Additionally, *He* fails to disclose or suggest the element of "applying a coating composition containing at least one **metal oxide**." To the contrary, He discloses forming a metal layer with a twin wire arc thermal spraying process in which arcing between the consumable electrodes (twin wires) liquefies the metal electrodes.

Furthermore, *He* fails to disclose or suggest the element of "applying a coating composition containing at least one metal oxide onto the roughened surface, wherein depositing a coating composition onto the roughened surface includes **filling and covering the micofissures**."

It is Applicant's understanding that *Takamasa* discloses a method of forming an oxide film on a substrate with a high temperature plasma or by spraying. The oxide layer constitutes a radiocatalyst, and irradiating the oxide layer generates a redox reaction, which makes the oxide layer hydrophilic. As a result, contaminating substances experience inhibited adhesion to the oxide layer (used as a coating for radioactive pipelines in nuclear reactors) and/or decompose.

The Examiner states that it would be obvious to use *Takamasa's* zirconium oxide coating on *He's* roughened surface in order to protect the substrate of *He*. However, Applicant respectfully submits that the subject matter of *Takamasa* would not have logically commended itself to an inventor's attention working with the subject matter of the instant application, and therefore should not be relied upon because it is nonanalogous art. MPEP § 2141.01(a).

Therefore, Applicant submits that the combination does not disclose or suggest the elements of (1) roughing produces microfissures, (2) applying a coating composition containing at least one metal oxide, and (3) the coating composition filling and covering the microfissures. Accordingly, Applicant respectfully requests

withdrawal of the rejections of claims 1-4 and 22 under 35 U.S.C. § 103(a) over *He* in view of *Takamasa.*

Claims 5-8, 20 and 21

The Examiner rejected claims 5-8, 20 and 21 under 35 U.S.C. § 103(a) as being unpatentable over *He* in view of *Takamasa,* as applied to claim 1 above, and further in view of Huang, U.S. Pat. No. 6,623,559 B2 (hereinafter "*Huang*") and Fortin, U.S. Pub. No. 2003/0073307 A1 (hereinafter "*Fortin*").

Applicant teaches and claims in claims 5-8, 20 and 21 applying a coating composition comprising a **metal oxide** onto the roughened surface with a **plasma spray** by providing a plasma generating gas and the coating composition to a **plasma gun**, and directing the plasma spray toward said roughened surface in a manner sufficient to apply the coating composition to the roughened surface.

It is Applicant's understanding that *Huang* discloses a method for producing semiconductor quantum particles. In the method a **metallic element and a non-oxygen reactant element** are atomized utilizing a plasma spray nozzle. (col. 7, lines 20-25). The process of forming particles in *Huang* is applicable to essentially all metallic materials, including pure metals. (col. 8, lines 38-41). Thus, *Huang* does not remedy the deficiencies of *He/Takamasa* in failing to disclose the limitations of (1) roughing produces microfissures, (2) applying a coating composition containing at least one **metal oxide**, and (3) the coating composition filling and covering the microfissures.

It is Applicant's understanding that *Fortin* discloses a method for depositing a **conductive** material using ionized PVD. Thus, *Fortin* does not remedy the deficiencies of *He/Takamasa* in failing to disclose the limitations of (1) roughing produces microfissures, (2) applying a coating composition containing at least one **metal oxide**, and (3) the coating composition filling and covering the microfissures.

Applicant, accordingly, respectfully requests withdrawal of the rejections of claims 5-8, 20 and 21 under 35 U.S.C. § 103(a) over *He* in view of *Takamasa,* and further in view of *Huang* and *Fortin.*

Claims 9 and 10

The Examiner rejected claims 9 and 10 under 35 U.S.C. § 103(a) as being unpatentable over *He* in view of *Takamasa*, as applied to claim 1 above, and further in view of Sugawara et al., U.S. Pub. No. 2004/0206388 (hereinafter "*Sugawara*"). The Examiner specifically relies upon Sugawara for disclosing "a semiconductor substrate is mechanically treated (i.e. sandblasted) to a roughness of approximately 200 microinches [0053]."

It is Applicant's understanding that *Sugawara* discloses a method of manufacturing a photoelectric conversion device in which roughened crystalline semiconductor **particles** 3 are placed on a substrate 1. The crystalline semiconductor particles 3 are preferably formed by a melt-drop method in which a molten semiconductor solution is dropped in a non-contact fashion [0039] and the crystalline semiconductor particles 3 are also preferably roughened to 5 microns or less (approximately 197 microinches) by etching, sandblasting, or the like [0053].

Therefore, *Sugawara* does not disclose or suggest roughening a **substrate** to 197 microinches. Accordingly, Applicant respectfully requests withdrawal of the rejections of claims 9 and 10 under 35 U.S.C. § 103(a) over *He* in view of *Takamasa,* and further in view of *Sugawara.*

Claims 11-13

The Examiner rejected claims 11-13 under 35 U.S.C. § 103(a) as being unpatentable over *He* in view of *Takamasa,* as applied to claim 1 above, and further in view of Gorczyca et al., U.S. Pub. No. 2002/0094686 A1 (hereinafter "*Gorczyca*").

The Examiner states on page 6 of the Office Action mailed on 2/25/08 that "He/Takamasa does not disclose using a high concentration strong acid immersion bath" and that it would have been obvious "to utilize Gorczyca's strong acid solution in He's immersion bath in order to effectively clean the substrate of debris."

It is Applicant's understanding that *Gorczyca* discloses a method of processing a semiconductor article to be used in a low pressure chemical vapor deposition (LPCVD) furnace for prolonged periods without requiring cleaning to remove the built-up film. (Abstract). The method includes chemically roughening the quartz surface of the article with an etching solution containing more than 0 to 70 volume % acid [0005], [0028].

The Examiner suggests that it would be obvious "to utilize Gorzyca's strong acid solution in He's immersion bath **in order to effectively clean the substrate of debris**." However, Applicant respectfully points out, that as discussed above *He* specifically **teaches away** from utilizing a strong acid concentrations of 20 volume percent and above because this results in excessively etching grain boundary regions and forming or exacerbating (or intensifying) microcracks.

Therefore, Applicant respectfully submits that one of ordinary skill in the art would not be motivated to modify the process of *He* to include a high concentration strong acid immersion bath. Accordingly, Applicant respectfully requests withdrawal of the rejections of claims 11-13 under 35 U.S.C. § 103(a) over *He* in view of *Takamasa,* and further in view of *Gorczyca.*

Claims 16-19

The Examiner rejected claims 16-19 under 35 U.S.C. § 103(a) as being unpatentable over *He* in view of *Takamasa,* as applied to claim 1 above, and further in view of *Gorczyca.*

The Examiner states on pages 6-7 of the Office Action mailed on 2/25/08 that "He/Takamasa do not disclose microffisures in the surface up to about 0.005 or 0.006 inches followed by filing/covering said microfissures" and that it would have been obvious "to modify He/Takamasa's method by filling/covering Gorczyca's microfissures in the surface of the substrate in order to successfully support additional layers."

However, Applicant respectfully submits that *He* **teaches away** from creating microfissures during bead blasting because the microcracks can be exacerbated during subsequent treatment steps. Therefore, Applicant respectfully submits that one of ordinary skill in the art would not be motivated to modify the process of *He* to create microcracks during bead blasting.

Accordingly, Applicant respectfully requests withdrawal of the rejections of claims 16-19 under 35 U.S.C. § 103(a) over *He* in view of *Takamasa,* and further in view of *Gorczyca.*

Claim 14

The Examiner rejected claim 14 under 35 U.S.C. § 103(a) as being unpatentable over *He* in view of *Takamasa, Gorczyca,* and further in view of Tarng et al., U.S. Pat. No. 4,349,408 (hereinafter "*Tarng*"). The Examiner relies upon *Tarng* for the disclosure of an etching solution comprising nitric acid and hydrofluoric acid.

It is Applicant's understanding that *Tarng* discloses a method of making a Schottky diode that includes etching a phosphorous doped polycrystalline silicon layer and an oxygen doped polycrystalline silicon layer with an etching solution comprising nitric acid and hydrofluoric acid.

The Examiner states that "it would have been obvious to one skilled in the art at the time of the invention to employ Tarng's etching solution in He/Takamasa/Gorczyca's method **in order to more effectively remove unwanted species from the surface of the substrate.**" However, Applicant respectfully submits that the Examiner has not established a **reasonable expectation of success** in the combination because none of He/Takamasa/Gorczyca's methods require the removal of unwanted phosphorous doped polycrystalline silicon or oxygen doped polycrystalline silicon species from the surface of the substrate.

Accordingly, Applicant respectfully requests withdrawal of the rejections of claim 14 under 35 U.S.C. § 103(a) over *He* in view of *Takamasa, Gorczyca* and further in view of *Tarng.*

Claim 15

The Examiner rejected claim 15 under 35 U.S.C. § 103(a) as being unpatentable over *He* in view of *Takamasa, Gorczyca,* and further in view of Haerle et al., U.S. Pat. No. 6,565,667 B2 (hereinafter "*Haerle*").

As amended, claim 15 requires the coating composition is yttrium oxide. In view of the above comments with regard to independent claim 1 Applicant respectfully requests withdrawal of the rejections of claim 15 under 35 U.S.C. § 103(a) over *He* in view of *Takamasa, Gorczyca* and further in view of *Haerle.*

Double Patenting

The Examiner rejected claims 1, 11, 12 and 14 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 4, 6, and 10 of *He*. Although the conflicting claims are not identical, they are not patentably distinct from each other because *He* teaches a method of fabricating a process chamber component that has a ceramic form with grains and grain boundary regions.

In view of the amendment to independent claim 1 Applicant respectfully submits that the Examiner's double patent rejection is moot.

New Claims

New claim 23 claims "wherein roughening the surface of the substrate material comprises leaving microparticles of the substrate material on the roughened surface, and wherein treating the roughened surface with a strong acid comprises removing at least some of the microparticles of the substrate material from the roughened surface." It is Applicant's understanding that these limitations are not taught by the prior art of record.

Pursuant to 37 C.F.R. 1.136(a)(3), applicant(s) hereby request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. 1.16 and 1.17, to Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

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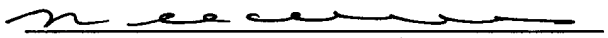

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